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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/722,737	11/28/2000	Kazuhiro Nobori	2000_1645A	5253

7590

12/19/2002

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EXAMINER

ROSE, KIESHA L

ART UNIT	PAPER NUMBER
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2822

DATE MAILED: 12/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/722,737

Applicant(s)

NOBORI ET AL.

Examiner

Kiesha L. Rose

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 August 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-55 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-55 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This Office Action is in response to the amendments filed 28 August 2002.

Drawings

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the joining member must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The amendment filed 28 August 2002 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: "projecting electrodes". This limitation was added to the specification and therefore is considered new matter.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 27-55 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 27-55 disclose "projecting electrodes" whereas this limitation was not in the original disclosure and therefore is considered new matter. Claim 55 discloses the joining member to comprise solder and conductive paste. This limitation is not disclosed in the specification. The specification discloses the joining member to be either solder or a conductive paste. Therefore this limitation is new matter.

Claims 27-55 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: the joining member in the drawings. It is unclear what the joining member is in the disclosure and how the joining member is joined to the lower electrode and the heat radiating plate. If the lower electrode is solder how/where is the joining member (solder and conductive paste) located on the lower electrode and the heat radiating plate.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

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The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 31,38,45 and 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 31,38,45 and 52 refer to a second semiconductor being "different from" the first semiconductor. It is unclear as to how the second semiconductor is "different from" the first semiconductor. Is it a different material or a different size?

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27-31, 33-35, 38, 40-45, 47-49, 52 and 54, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (U.S. Patent 5,783,466) in view of Hikita et al. (U.S. Patent 6,133,637).

Takahashi discloses a semiconductor device (Figs. 1b and 2c) that contains a first and second semiconductor (12) having electrodes formed on both the upper and lower faces of the semiconductor, a copper heat radiating plate (16) that is joined to the lower face (13) of the semiconductors (12), smooth pressed projecting electrodes (29) that are joined to the heat radiating plate (16) and substantially equally spaced relative to the other, an electric circuit (21) made of copper and set to ceramic with the first and

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second semiconductor (12) joined thereto, a sealing resin (24,26,27) that covers the first and second semiconductors (12) and a face of the heat radiating plate (16) so that the leading ends of the projecting electrodes (29) are exposed. Takahashi discloses all of the limitations except for there being projecting electrodes joined to the semiconductors.

Whereas Hikita discloses a semiconductor device (Figs. 7 and 19) that contains a semiconductor (14) with projecting electrodes (16b) formed on the semiconductor with bump (14c) formed between projecting electrodes (16b) and semiconductor (14). The projecting electrodes are formed on the semiconductor to provide an electrical connection to another chip or an external circuit. Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor device of Takahashi by incorporating projecting electrodes formed on the semiconductors to provide electrical connections to another chip or an external circuit as taught by Hikita. In regards to Claims 34 and 48 referring to the removal of the sealing resin, a "*product by process*" claim is directed to the product per se, no matter how actually made, *In re Hirao and Sato et al.*, 190 USPQ 15 at 17 (CCPA 1976) (footnote 3). See also *In re Brown and Saffer*, 173 USPQ 685 (CCPA 1972); *In re Luck and Gainer*, 177 USPQ 523 (CCPA 1973); *In re Fessmann*, 180 USPQ 324 (CCPA 1974); and *In re Marosi et al.*, 218 USPQ 289 (CAFC 1983) final product per se which must be determined in a "*product by, all of*" claim, and not the patentability of the process, and that an old or obvious product, whether claimed in "*product by process*" claims or not. Note that Applicant has the burden of proof in such cases, as the above caselaw makes clear. "Even though product -by [-] process claims are limited by and

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defined by the process, determination of patentability is based upon the product itself. The patentability of a product does not depend on its method of production. If the product in product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product is made by a different process." *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985)(citations omitted).

Claims 32 and 46, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi and Hikita as applied to claim 1 above, and further in view of Sakai et al. (U.S. Patent 5,294,750).

Takahashi and Hikita disclose all of the limitations except for the heat radiating plate to contain a ceramic structure with conductor layers therebetween. Whereas Sakai discloses a ceramic package (Fig. 1 and 10) that contains a ceramic heat radiating plate (1) with a ceramic layer (4) with conductor layers (8) formed therebetween. A ceramic heat radiating plate with conductor layers is formed to radiate heat generated in the chip, for high mechanical strength and to have excellent electrical characteristics. (Column 4, lines 24-31) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor devices of Takahashi and Hikita by incorporating a ceramic heat radiating plate with conductor layers to radiate heat generated from the chip, to have high mechanical strength and excellent electrical characteristics as taught by Sakai.

Claims 36, 37 and 50-51, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. and Hikita as applied to claims 28 and 41 above, and further in view of Kondoh et al. (U.S. Patent 5,448,114).

Takahashi and Hikita disclose all of the limitations except for the projecting electrodes to be formed of materials with different hardnesses and melting points between the inside and outside layers of the electrodes. Whereas Kondoh discloses a semiconductor flip chip (Fig. 19) that contains a projecting electrode that contains a high melting point copper core layer (44) surrounded by a low melting point solder layer (45). The projecting electrode is formed with a core layer surrounded by a solder layer to make the distance between bumps shorter to form narrower pitches. (Column 5, lines 7-10) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor devices of Takahashi and Hikita by incorporating the projecting electrodes to contain materials of different hardnesses and melting points to make distance between bumps shorter to form narrower pitches as taught by Kondoh.

Claims 39 and 53, as far as understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. and Hikita et al. as applied to claim 1 above, and further in view of Urushima (U.S. Patent 6,046,495).

Takahashi and Hikita disclose all of the limitations except for the heat radiating plate to comprise pits and projections. Whereas Urushima discloses a semiconductor device (Fig. 4a) that contains a heat radiating plate (24) with a heat sink containing pins and projections. The heat radiating plate contains pins and projections to improve heat dissipation. (Column 1, lines 58-60) Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the semiconductor

devices of Takahashi and Hikita by incorporating pins and projections on the heat radiating plate to improve heat dissipation as taught by Urushima.

Response to Arguments

Applicant's arguments with respect to claims 27-55 have been considered but are moot in view of the new ground(s) of rejection. In regards to applicant's arguments referring to claim 35 that the projecting electrodes are of uniform height. The projecting electrodes of the Takahashi (Fig. 2c) show that the projecting electrodes are of the same height. In regards to claims 29 and 43, the sealing resin covers the semiconductors and the surface of the heat radiating plate but does not cover the leading ends of the projecting electrodes. The Takahashi reference shows this limitation and therefore the rejection stands. In regards to claims 31 and 45, that the circuits don't have independent polarities. The circuits (22) are separated from one another which makes them act alone and therefore would have independent polarities. Therefore the rejections stand.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kiesha L. Rose whose telephone number is 703-605-4212. The examiner can normally be reached on M-F 8:30-6:00 off 1st Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers

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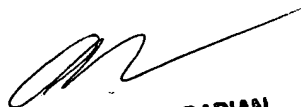
for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

KLR

KLR

December 11, 2002


AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
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